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ABSTRACT

Developed as part of a New Hampshire project entitled "Curriculum Activity Planning for Schools," this manual supplements the project guide (CE 021 833) on how to establish components for a competency-based vocational secondary school curriculum. The essential components for curriculum development are classified in an introductory section as inputs (developing program and needs assessment data statement, establishing job family cluster, and analyzing tasks to create competencies), plan (creating instructional objectives and selecting learning activities and instructional resources), and outputs (developing evaluation techniques and designing effective recordkeeping). Then, section 1 provides a glossary of terms and meanings related to the components. Sections 2-4 contain definitions, procedures, examples, and worksheets to construct each component. The last section provides suggestions for the sequence and form of activities within each component classification.

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ED176041

How To Develop a

CURRICULUM

for

Vocational Courses

A MANUAL

for

New Mexico Vocational Educators

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Cover and illustrations by Diane Stolar.

FOREWORD
TO GUIDE AND MANUAL

In July of 1977, the Vocational Curriculum Research Office at Keene State College in cooperation with the Vocational-Technical Division of the State Department of Education assembled a committee of New Hampshire Vocational Educators to identify the elements of a good curriculum. The committee, composed of vocational teachers, local administrators at the Secondary or Post-Secondary level and State Vocational Program Consultants, held numerous meetings during 1977-78. The committee concluded that three elements were considered important in developing a good curriculum. These were:

A. Format -The overall scope and sequence of an instructional program or curriculum.
B. Component -The parts that comprise the format.
C. Style -The manner or form in which the format is presented.

Considerable study of all three elements was conducted by the committee. Agreement on format and components was achieved. Style was considered to be an element that each vocational instructor could best determine individually.

Upon agreement of a suggested format and components of a curriculum, the committee discussed the best method of presenting this information to vocational educators. It was recognized that existing curricula of vocational instructors, when related to the suggested format and components, would vary considerably. Many experienced vocational instructors could easily match their curricula to the format and components suggested. Others, possibly those with limited experience, or certainly new instructors, would find the committee's work in establishing a suggested curriculum format and components most useful in improving or establishing a good curriculum.

To accommodate the different levels of curriculum background that may be required by instructors, the committee decided to provide information at two levels. First, a brief booklet entitled, Establishing Curriculum Components, A Guide For New Hampshire Vocational Educators, was developed. The Guide provides an overview to creating a format and the appropriate components for a curriculum. The Guide is recommended for review by all vocational instructors.

Experienced instructors may require only a review of this Guide to determine if their curricula reflects the appropriate format and components.

For those instructors with limited or no experience in curriculum, a second level of information is provided in a more complete booklet entitled, How To Develop A Curriculum For Vocational Education, A Manual For New Hampshire Vocational Educators.

This booklet provides detailed help for any instructor who decides to improve curriculum format or components. All vocational instructors are encouraged to read the Guide. Where the reader requires more information, the Manual should provide further assistance.

HOW TO DEVELOP

A CURRICULUM

FOR VOCATIONAL EDUCATION

A Manual for New Hampshire Vocational Educators

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INTRODUCTION TO THE MANUAL

This Manual is designed as a supplemental document to Establishing Curriculum Components - A Guide For New Hampshire Vocational Educators.

The Manual will provide the reader with detailed information related to each component of a competency based curriculum that is described in the Guide. The reader should be sure to review the Guide prior to using the Manual. Each component identified in the Guide is footnoted to the appropriate section of this Manual.

The Manual begins by providing the reader with the components of the Vocational Education curriculum development process that were introduced in the Guide. The readers may wish to improve their understanding of curriculum terminology since many terms will be used in this Manual. Therefore, Section I of the Manual provides a list of terms and meanings related to all curriculum components. It is suggested that all users of the Manual review Section I.

Sections II, III, and IV provide definitions, procedures, examples and worksheets to construct each curriculum component. In some components there is supplemental information that is provided at the conclusion of the section. This material may further help the reader to construct the component.

Section V puts the components together in a suggested format that may be useful to the reader.

Remember, there are two purposes to a good curriculum. First, it establishes the student's and instructor's roles in the skill development process; and second, it communicates to other interested people what is to be accomplished in the instructional program. It is hoped this Manual will help you to reach these goals.

ESSENTIAL COMPONENTS OF A COMPETENCY BASED VOCATIONAL CURRICULUM

A competency based vocational curriculum is defined as a total system for planning, developing, implementing and evaluating student learning. It is done to ensure that students acquire measurable skills, knowledge and attitudes essential for successful job performance. It also provides vocational instructors with the classroom or lab management plan to direct student learning.

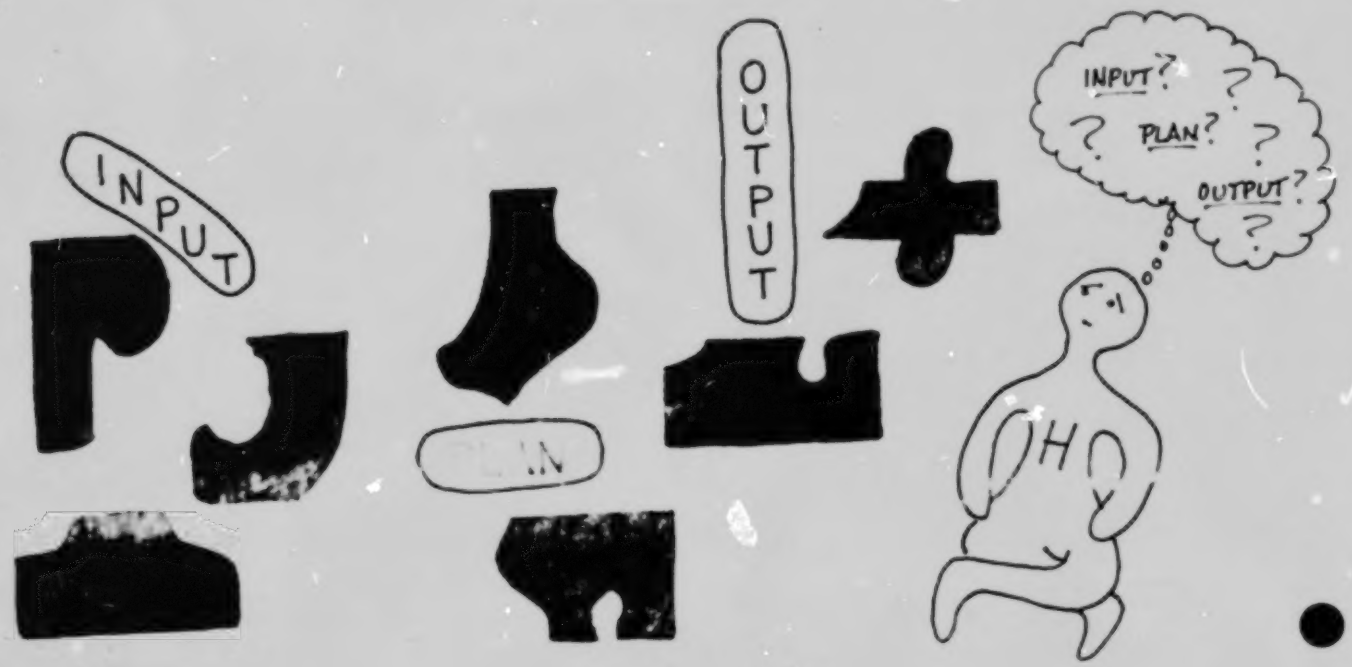
A curriculum design process has three phases.

Phase I -Gathering Information Needed Prior To Constructing The Curriculum (Inputs)
Phase II -Constructing The Curriculum (Plan)
Phase III-Determining The Measures Needed To Document The Curriculum (Outputs)

The chart on the following page identifies the curriculum components as:

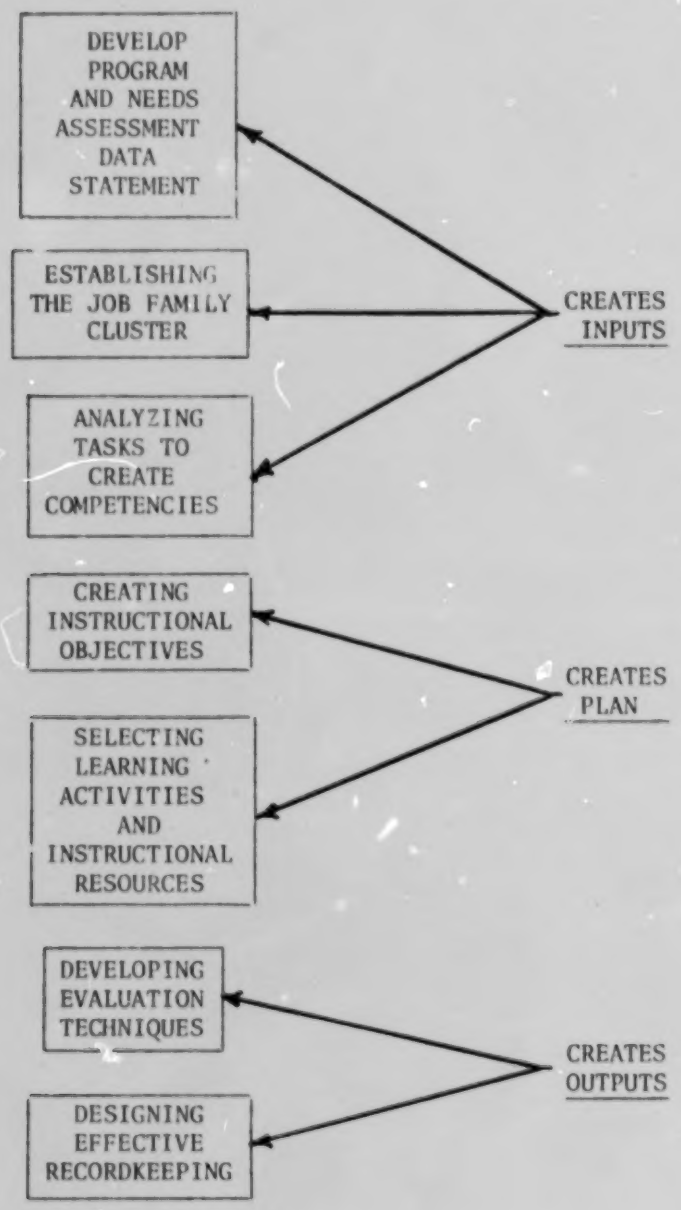
INPUTS	PLAN	OUTPUTS
Program Statement and Need Assessment Data, Establishing the Job Family Cluster and Analyzing Tasks To Create Competencies.	Creating Instructional Objectives, Selecting Learning Activities, and Instructional Resources.	Developing Evaluation Techniques and Designing Effective Recordkeeping.

THE CURRICULUM PUZZLE



THE COMPETENCY BASED VOCATIONAL CURRICULUM

COMPONENTS AND PROCESS



PART 1 - Components needed prior to constructing the curriculum (INPUT).

PART 2 - Components needed to construct the curriculum (PLAN).

PART 3 - Components needed to measure and document the curriculum (OUTPUT).

SECTION I

GUIDE TO TERMINOLOGY

GUIDE TO TERMINOLOGY

Activity - an educational procedure designed to stimulate learning by firsthand experience; or observation, experiment, inquiry and discussion necessary to achieve an objective.

Aid, Teaching - an instructional device or equipment designed to facilitate learning.

Aide, Teacher - Auxiliary personnel who assist in the classroom by providing management, tutoring, and individual aid to students.

Clustering (or Job Family Clustering) - developing instructional content around a series of occupational titles having a common skill base.

Competency - demonstration of mastery of occupational requirements that includes skills, knowledge, and attitudes necessary for job entry.

Competency-Based Education/Curriculum - a total system for planning, developing and implementing a curriculum designed to ensure that students acquire measurable skills, knowledge, and attitudes essential for successful job performance.

Conditions - the part of the performance objective that identifies the given situations or circumstances under which the stated behavior is to occur.

Contract (Student Learning, Student-Instructor) - an agreement reached via discussion and negotiation between the student and instructor which outlines the pace, strategies and objectives the student will use and provides individualizing of the course content (degree varies with each program).

Criteria - the part of the performance objective that specifies the standards selected as the basis for quantitative and qualitative comparison.

Criterion-Referenced Measure/Testing - an evaluation assessing the degree to which student performance meets the pre determined performance objectives.

Curriculum Guide - a document outlining the intended field of study and instructional content; usually includes goals and objectives, learning experiences, activities, teaching aids, references and evaluation techniques from which the instructor may select.

Educational Goals - descriptions of the long-range aims of the educational program and/or system, or a broad general end toward which the program is directed.

Evaluation - the process of determining or judging the value of work or work product by use of a standard of appraisal.

Feedback - the process that provides the basis for evaluation of the student's learning capacity, appropriateness of instructional materials and methods; provides knowledge of results and clarification (component of the instructional package); the process by which output performance is compared with criterion performance, providing information about efficiency, advantages and disadvantages of the system.

Formal Presentation - an instructional mode characterized by the instructor lecturing to the class; directing and initiating all procedures (films, projects, tests) to the class as a whole.

Instructional System - all components needed in the instructional process: needs assessment, occupational clustering, task analysis, competency-based objectives, teaching methods, criterion-referenced testing, evaluation, recordkeeping and follow-up; (A scheme for developing and achieving instructional objectives.)

Instructional Unit - instructional content (job/information sheets) containing a set of behavioral objectives, activities, pre post checks, resources and means of assessment; a group of related components or tasks in an occupation directed toward a common purpose.

Job Entry Level Skills - the skills, knowledge and attitudes that must be mastered or that demonstrate the minimum acceptable level of competency in order to meet employer's standards for specified work.

Job Family Clustering - See Clustering.

Learning Activities - See Activity.

Norm-Referenced Measure/Testing - instruments or measures that determine the quality of a student's performance in relation to the performance of other students on the same measurement device.

Objectives

1. Affective - statements concerned with changes in interests, attitudes, values, appreciation, and personal social adjustment.

2. Behavioral - statements concerned with the behavior that instruction is to produce in terms of observable/measurable performance along with the conditions under which the action is performed and (where appropriate) the criteria.

3. Cognitive - statements concerned specifically with thought processes (knowledge, understanding).

4. Instructional - statements that specify the content, process, skills and attitudes to be achieved by the instructional program.

5. Interim - statements of performance(s) required of the student in the process of achieving terminal objectives.

6. Performance - statements derived from the task analysis statement, given in precise, measurable terms, and that detail the particular behavior to be exhibited by a learner as well as specifying the conditions and criteria associated with the behavior.

7. Psychomotor - statements that specify performance involving physical movement acting on some part of the environment or material.

8. Sequenced - the process of arranging performance objectives in order to permit the learner to progress from one activity to another building on previous experience to achieve the next objective (going from simple to complex).

9. Terminal - statements that specify what student performance is to be at the conclusion of instruction.

Occupational Field - a group of jobs that are related on the basis of required skills and knowledge.

Occupational Tests - a group of work activities that are associated for a common purpose or end, and that collectively have meaning or use to a job.

Occupational Task Analysis - a determination of the necessary activities and skills involved for the successful performance of a task.

Performance-Based - when the scope and sequence of instruction is determined by student accomplishment of minimum competencies.

Performance Standards - the criteria specified in the performance objective in terms of observable, measurable behavior. (See Criteria.)

Post-Test (or Assessment) - an evaluation instrument that measures the behavior, abilities and skills of the student upon completion of instructional objectives or at the termination of an instructional unit.

Pre-Test (or Assessment) - an evaluation instrument that measures the entry behaviors, abilities and skills of a student in terms of prior experience.

Recordkeeping - the maintenance of a student's progress and evaluation of the work accomplished by the instructor and/or student at regular intervals.

Resources - includes both instructional media and facilities; e.g., slide-audio tapes, reference books, models, equipment, modules, simulators, learning packages, learning centers, carrels, mock-ups, games.

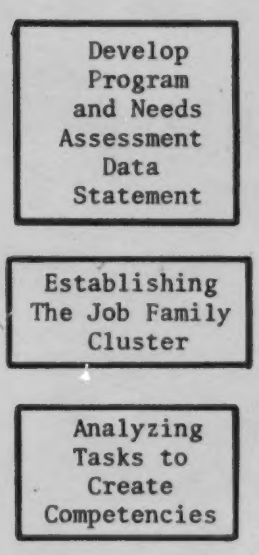
Small Group - a type of instruction allowing for student reaction to and interaction with the instructional content.

Task - a logically related set of actions required for the completion of a job.

SECTION II

CREATING INPUTS NEEDED

FOR THE CURRICULUM


Develop Program and Needs Assessment Data Statement
Establishing The Job Family Cluster
Analyzing Tasks to Create Competencies

DEVELOP PROGRAM AND NEEDS ASSESSMENT DATA STATEMENT

Vocational education has been described as "the bridge between people and work." Vocational instruction, therefore, must equip students with the skills necessary to allow them job entry into their chosen field upon completion of the program. Successful instruction relies upon three types of assessment:

1. the employment needs of the community, region and nation (JOBS)
2. the students' aptitudes, abilities, interests and needs as related to developing selected occupational skills (PEOPLE)
3. the facilities and resources in both the school and community to aid in accomplishing skill development in the identified occupational fields (INSTITUTIONS).

Have you ever addressed your program in this way? Even if you have, how long ago was it? It doesn't matter how well-developed your program is at this point; a good needs assessment may indicate that you should be considering some instructional changes.

To help you further, answer the questions regarding needs assessment on the following checklist. If you answer "no" to any of the statements we would refer you to The New Hampshire Needs Assessment Handbook for Vocational Education Planning developed for instructors and administrators of New Hampshire schools. It will provide you with a detailed process plan to accomplish the necessary needs assessment. The Handbook is available through the Research Coordinating Unit, Vocational-Technical Division of the New Hampshire State Department of Education. Each New Hampshire

vocational center also has a copy of this handbook. Ask your Vocational director where the handbook can be found in your center.

NEEDS ASSESSMENT CHECKLIST

Current data are available and used in the development of your instructional program in the following areas:

1. The manpower requirement in your occupational field for your community and/or region

2. Student characteristics:

   a. current enrollments and projections
   b. prerequisite learning (English, math, etc.)
   c. special needs requirements
   d. existence of sex role stereotyping
   e. attrition rates and causes
   f. student interests
   g. educational aspirations

3. Population characteristics of the community and/or region being served:

   a. income
   b. highest educational level completed
   c. population growth (rate of)

4. Follow-up surveys of previous graduates:

   a. were student prepared to enter chosen field(s)
   b. number entering occupations

5. Are facilities considered adequate?

6. Does an improvement plan exist?

7. Is an advisory committee organized with validation of instructional content assured?

Remember, if you answered "no" to any of the above questions, we strongly urge you to get a copy of the New Hampshire Needs Assessment Handbook for Vocational Education Planning. See your Vocational director for a copy or write to the State Research Coordinating Unit. The remainder of this manual is written with the assumption that you will be able to answer "yes" to all questions on the Checklist.

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Once you have assembled the Needs Assessment Data, you may want to combine this information in a Program Statement. The Program Statement is used to provide various interest groups, such as students, parents and educational groups, with the background of the program. Any or all items contained in the Needs Assessment checklist may be used in a Program Statement.

The following is an example:

Region #XYZ Vocational Center offers a two year automotive program to Junior and Senior students of any High School in the region. Students are provided equal access to a safe environment consisting of an automotive laboratory equipped with the latest automotive repair tools and test equipment. The program is taught by experienced certified instructors. The curriculum makes every effort to continuously reflect the students' and the communities' needs in automotive occupations.

Students entering the auto mechanics program receive the theoretical and practical skills required for each occupation considered to have employment opportunities in the automotive field in the region. Each student is encouraged to develop the work attitudes considered necessary to succeed in the job.

The skills included in the program are continuously reviewed to reflect current technology. Surveys of potential employment needs and skill requirements for job entry are made annually by a program craft advisory committee. A recent committee study confirms that 50-75 auto mechanic or related positions are estimated to be available within a fifty mile radius of the XYZ Vocational Center in the next five years. Current student enrollment is adequate to fill the estimated needs. Each student successfully completing the competencies required in the program is provided help in obtaining suitable job placement.

NOTE: Same example as Guide, page 5.

ESTABLISHING THE JOB FAMILY CLUSTER

Assuming that Needs Assessment relating to jobs, student characteristics and instruction capability has been accomplished, you need to determine the range of training feasible in the instructional program.

Job Family Clustering means developing instructional content around a series of occupational titles having a common skill base.

Below is a list of the steps required to accomplish Job Family Clustering. Information is provided to help you understand the significance of each step that is listed.

Job Family Clustering Process

Step 1 - Select the Job Family

What is the title of your program? Auto Services, Health Occupations, Office Occupations, Building Trades and Food Services are examples. See Sample Sheet #1.

Step 2 - Determine the Occupations in the Job Family

Using the following publications, list all occupations in the job family that are feasible for the instructional program.

A. Dictionary of Occupational Titles (D.O.T.)
B. Vocational Education and Occupations
C. Occupational Outlook Handbook

See Sample Sheet #1.

The Dictionary of Occupational Titles can be found in most school libraries. It is a reference book containing titles and descriptions for thousands of occupations found in the United States. You will find that a nine-digit numbering system is used to identify each occupation. As you identify job titles from this source, also write the D.O.T. number and the page number where the job description is found.

NOTE: All D.O.T. numbers found on the various Sample Sheets in this manual have been referenced from the new fourth edition of the D.O.T. published in 1977.

Vocational Education and Occupations, 1965, can be acquired from your vocational director or through the State Department of Education consultant in your vocational area. This book is the U.S. Office of Education publication relating instructional programs to various D.O.T. occupations for which vocational training programs exist throughout the United States. Each occupation is placed in a program category and a number is assigned to each program.

Supplement A and B of this section provide you with a detailed description of how to use the D.O.T. and Vocational Education and Occupations.

Occupational Outlook Handbook Annual is the U.S. Department of Labor publication that predicts job trends for most major occupational fields throughout the United States.

When the list is complete, relate your job needs information developed in the Needs Assessment component to your list. Determine whether each occupation will be included in your program. Write "yes" or "no" next to each occupation.

Step 3 - Organize Occupations According to Job Entry Level

Divide the listed occupations into three categories: Low, Middle and Upper Job Entry Levels. Use D.O.T. numbers for each occupation. See Sample Sheet #2 and then make up your own worksheet and write the categorized titles on it.

The cluster should contain successful skill development for students in a wide ability level. By developing a program that has a varied complexity in the skill base, a wide variety of students can be served.

Step 4 - Determine Occupations to be Included in Your Program

Review the materials gathered in the Needs Assessment concerning regional employment needs, student interest and aptitudes and institutional training facilities. Apply this information in selecting three to five (this will vary) occupations in each of the three Job Entry categories you listed. Circle these occupations on your worksheet, composing your own listed occupations similar to Sample Sheet #2.

SAMPLE SHEET 1
Job Family Clustering

Step 1
Select the Job Family

Job Family Automotive Services

Step 2
Determine Occupations in the Job Family

Occupational Title In Program	D.O.T. Number	U.S.O.E. Program Number	D.O.T. Job Description Page Number
Service Rep. Auto Mfg.	191.167-02	04.03	140
Salesperson Auto Retail	273.353-010	04.03	211
Service Station Attendant	915.467-010	17.0399	889
Tire Repairer	915.684-010	17.03	890
Mechanical Maintenance Sup.	638.131-026	17.03	556
Auto Radiator Mechanic	620.381-010	17.0303	538
Auto Parts Clerk	222.367-042	17.03	186
Auto Washer	919.687-014	17.03	891
Brake Repairer	620.281-026	17.0303	537
Auto Electrician	825.281-022	17.03	839
Air Conditioning Mechanic	620.281-010	17.01	537
New Car Get-Ready Specialist	806.361-026	17.03	831
Lubrication Servicer	915.687-018	17.03	890
Auto Mechanic Apprentice	620.281-012	17.03	537
Tune-Up Mechanic	620.281-066	17.0303	538
Transmission Mechanic	620.281-062	17.0303	538
Front End Mechanic	620.281-038	17.0303	538
Auto Tester	620.261-014	17.0302	537
Auto Accessories Installer	806.684-038	17.0305	816
Used Car Renovator	620.684-034	17.03	539
Service Station Mechanic	620.261-010	17.03	536

WORKSHEET 1
Job Family Clustering

Step 1
Select the Job Family

Job Family _____

Step 2
Determine Occupations in the Job Family

Occupational Title In Program	D.O.T. Number	U.S.O.E. Program Number	D.O.T. Job Description Page Number

SAMPLE SHEET 2
Job Family Clustering

Step 3
Organize Occupations according to Job Entry level

Step 4
Determine Occupations to be included in your program

Entry level	Occupational Title	D.O.T. Number	U.S.O.E. Number
LOW	1. Service Sta. Att.	915.467-010	17.0399
	2. Tire Repairer	915.684-010	17.03
	3. Lubrication Servicer	915.687-018	17.03
	4. Auto Washer	919.687-014	17.03
MIDDLE	1. Service Sta. Mechanic	620.261-010	17.03
	2. Brake Repairer	620.281-026	17.0303
	3. Auto Parts Clerk	222.367.042	17.03
	4. Front End Mechanic	620.281-038	17.0303
	5. Tune-Up Mechanic	620.281-066	17.0303
UPPER	1. Auto Electrician	825.281-022	17.03
	2. Auto Mech. Apprentice	620.281-012	17.03
	3. Transmission Mechanic	620.281-062	17.0303
	4. Air Cond. Mechanic	620.281-010	17.01
	5. Mechanical Maintenance Supervisor	638.131-026	17.03

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WORKSHEET 2
Job Family Clustering

Step 3
Organize Occupations according to Job Entry level

Step 4
Determine Occupations to be included in your program

Entry level	Occupational Title	D.O.T. Number	U.S.O.E. Number
LOW			
MIDDLE			
UPPER			

SUPPLEMENT A

THE DICTIONARY OF OCCUPATIONAL TITLES WHAT IT IS AND HOW TO USE IT

The Dictionary of Occupational Titles (D.O.T.) is published by the United States Department of Labor. The D.O.T. focuses on occupational classifications and definitions. It includes standardized and comprehensive descriptions of job duties and related information for 20,000 occupations contained in the United States economy. It is designed as a job placement tool to facilitate matching job requirements and worker skills. The book can be very valuable to anyone attempting to analyze an occupation or select occupations for an instructional program. Copies can be found in most public libraries and in each vocational center in the State.

The third edition, comprising two volumes, was printed in 1965.

The fourth edition (1977 edition) has just been released. Your school or library may or may not have the new edition, which has been printed in one volume. The occupational titles and numbers in this manual are based upon the new fourth edition (1977). If the reader is not using this latest edition the D.O.T. occupational numbers may vary from the examples presented. The reader is encouraged to seek out the fourth edition.

Meaning of D.O.T. Numbers

Each occupation in the D.O.T. is assigned a nine digit code number. There are three digits to the left of a decimal point and six digits to the right of the decimal point separated by a hyphen between the third

and fourth digit, for example 201.362-030 is the D.O.T. number for a secretary (clerical).

The first three digits indicate the occupation group arrangement. Jobs are grouped according to some combination of work field, purpose, material, product, service, subject matter, generic term or industry. There are nine categories for the first digit, 84 possible combinations for the first two digits and 603 possible combinations for all three digits. As an example, let's use the number for a secretary: "201." are the first three digits. The first three digits to the right of the decimal point identify the specific occupational group the job title is found in. Using the secretary as an example, the 201 is determined as follows:

First digit position:	Category 2	Clerical and Sales Occupations
Second digit position:	Division 20	Stenography, Typing, Filing and related occupations
Third digit position:	Group 201	Secretaries

Definitions of each of the categories, divisions and groups appear on page xvii in the introduction to the 4th edition of the D.O.T.

The first set of three digits to the right of the decimal point are based on the occupation's relationship to data, people, or things. These digits reflect the degree of involvement with data, people, or things; how simple or complex the involvement is; and the highest function the worker will have to assume in dealing with all three.

For example, using the same occupation (secretary/clerical), the three digits to the right of the decimal point are ".362." The digits represent the following:

Fourth digit position:	3	The worker function in the Data category is "Compiling."
Fifth digit position:	6	The worker function in the People category is "Speaking."
Sixth digit position:	2	The worker function in the Things category is "Operating-Controlling."

The listings of data, people, and things categories for digits four, five, and six can be found on page xviii in the introduction to the 4th edition of the D.O.T.

The last three digits to the right of the decimal point indicate the alphabetical order of titles within the six digit code. A number of occupations may have the first six digits but no two can have the same nine digits.

More information about these last three digits can be found on page xviii to the 4th edition of the D.O.T.

SUPPLEMENT B

HOW TO USE VOCATIONAL EDUCATION AND OCCUPATIONS

Vocational Education and Occupations is published by the United States Office of Education. It is designed to relate occupational titles appearing in the D.O.T. to vocational education instructional program titles used in educational institutions. To obtain a copy of this document, see your vocational director.

The relationship between occupational titles and instructional programs is described through the use of an eight-digit, numerically coded classification system.

It is important to use this classification system in addition to the system described in the D.O.T. As funding for vocational programs is partially accomplished through the U.S. Office of Education funds, vocational directors and state program consultants must report data by the U.S.O.E. Instructional Program Classification System. By understanding and using the system, you, therefore, are easing the reporting problems of those persons who are responsible for some of your program funds.

The system may appear complicated; however, it is suggested that you:

1. read the explanation of the example below;
2. read the explanation of the classification system appearing on page x of the document;
3. consult your vocational director or state consultant if you are still having problems.

Example: If you wanted to use the U.S.O.E. classification for the D.O.T. number 213.582 (Keypunch Operator), the occupation would be coded as shown on the following page.

U.S.O.E. Code 14.020201

Explanation:

(14.) is the major vocational area code number for the subject matter area of Office Occupations.

14.(02) is the principal segment of the subject matter: Business Data Processing Systems Occupations.

14.02(02) is the division of the principal segment: Peripheral Equipment Operators.

14.0202(01) is the first-level detail of the division of the principal segment: Keypunch and Coding Equipment Operators.

The above sample is taken from page x of the U.S.O.E. publication entitled, Vocational Education and Occupations. Please refer to that page for a more in-depth explanation of the classification system.

You recall earlier we explained that a new edition of the D.O.T. had been published in 1977. Unfortunately, the U.S.O.E. Guide explained here has not been revised to coincide with the 1977 Edition of the D.O.T. for new job titles extracted from the D.O.T. If no U.S.O.E. program number exists, use a 99 to the right of the decimal point. This signifies the occupation is not now identifiable with any given instructional program. Detailed reasons for this are explained on page xiv of the Introduction to Vocational Education in Occupations. If you're still not sure how to do this, ask your vocational director or state program consultant.

ANALYZING TASKS TO CREATE COMPETENCIES

A task is a unit of work that is part of the total job responsibility. A task statement is the written description of the actual work performed.

The skills training that you wish to achieve in an instructional program should be based upon the skills required for job entry in any given occupation. The skills are reflected in four levels:

Level 1	Duties	Major sub divisions that have distinct identities within the overall job. A DUTY of an auto mechanic, for example, is an engine tune-up. Duties are composed of several distinct tasks.
Level 2	Tasks	Necessary to the performance of duties. A series of activities with a common purpose that occur in close sequence. An engine tune-up involves such TASKS as replacing points or setting timing.
Level 3	Activities	Necessary to the performance of tasks. A series of actions with a common purpose that occur in close sequence. Adjusting the dwell involves such ACTIVITIES as loosening the nut lock with a wrench or attaching a dwell meter.
Level 4	Actions	Necessary to the performance of activities. These are short, simple operations that are frequently common to many activities. ACTIONS involve using tools, devices, simple test equipment and so forth.

Duties are usually too broad and activities and actions are too limited to allow for accurate measurement of student competencies.

The task level statement generally results in some type of product. A product can take the form of making a correct decision on the job. The task statement specifies both the action(s) performed and the object(s) to be acted upon.

Some examples of task statements are listed on the next page.

The auto body mechanic <u>can</u>:	1. Align front wheel 2. Install door glass 3. Weld or brace metal 4. Diagnose malfunctions
The nurse's aide <u>can</u>:	1. Greet patients 2. Record information 3. Make hospital beds 4. Maintain confidentiality
The data accountant <u>can</u>:	1. Process sales orders 2. Prepare invoices 3. Calculate payroll 4. Identify and correct errors

You may notice that it is helpful to use the word "can" prior to the task statement. "Can" is usually followed by the action performed.

Although the task statements are the important tools in listing the job role, the duty statements are those from which the task statements are derived. As you begin to break down any job role, list both the duties and the tasks.

The Sample Sheet that follows provides a further example of how duty and task statements should be written.

Now that you have a better understanding of what duty and task statements are, let's tie their function into the Job Family Clustering that you completed earlier. Follow the steps below:

1. Using your worksheet created in the Job Family Clustering component, identify the single most complex occupation in the cluster. (We have selected Apprentice Auto Mechanic in our Sample Sheet #3.)

2. Develop your own worksheet, similar to our Sample Sheet #3, which will contain all duties and tasks for the selected occupation. (Note: As a duty-task list is extensive, we provide only a single duty statement and the breakdown of tasks for that duty.)

3. As you look at the complete list of duties and tasks, ask yourself this question: does the duties and task listing for this occupation include all the duties and tasks for the low, middle and other

high entry occupations in your cluster? If you answered "yes," you should go on to Step #4.

If you answered "no," you will have to list the additional duties and tasks for each of the other occupations before going on to Step #4.

Step 4 - Using Sample Sheet #3 as a guide, number your tasks in the sequence that they will be presented in instruction. Re write the tasks in this order on about blank worksheet. This should then look like our Sample Sheet #3.1.

In some cases, instructors find that a single duty statement can be translated into an instructional unit title. The task statements form the basis for a list of instructional competencies. In other words, tasks are usually what are referred to when we analyze an occupation; but when the task is reflected in an educational outcome for students, educational instructors usually refer to them as competencies.

Once you have determined your task/competency list, you can consider "Creating Instructional Objectives." The next component will show you how to accomplish this.

SAMPLE SHEET #3

JOB FAMILY Automotive Services D.O.T. # 620.281

OCCUPATIONAL TITLE Apprentice Mechanic U.S.O.E # 17.03

DUTIES	TASKS/COMPETENCIES	INSTRUCTIONAL ORDER
0.1 Maintains Suspension, Steering and Tires	Rebushes spring shackles	2
	Replaces complete spring	4
	Lubricates chassis	6
	Renews and spaces bearings	8
	Aligns wheels	10
	Services or replaces shock absorbers	12
	Changes leaves and springs	1
	Rebuilds spring shackles	3
	Repairs frame	5
	Rebushes and renews front pivot pins	7
	Overhauls and repairs steering gear	9
	Removes and replaces power steering pump assembly	11
	Repairs, services or replaces tires (mounts and demounts tires, repairs punctures, replaces valves, rotates tires, balances tires)	13
0.2 Maintains, Repairs, and Replaces Brakes	Repairs and replaces brake shoes	2
	Diagnoses brake problems	1
	Arcs brake shoes	4
	Turns brake drums	3
	Adjusts brake	5
	Rebuilds wheel cylinder	6
	Repairs and replaces master cylinders	8
	Repairs and replaces wheel cylinders	7
	Repairs and replaces disc brake caliper units	14
	Flushes brake system	15
	Rebuilds master cylinders	9
	Repairs, replaces and adjusts pressure differential valves	10
	Repairs and replaces vacuum power brake units	20
	Repairs and replaces air brake units	21
	Adds fluid to brake systems	22
	Repairs and replaces brake hoses/lines	11
	Repairs and replaces disc brake pads	12
	Turns brake rotor assemblies	13
	Bleeds brake system	16
	Repairs and adjusts parking brakes	17
	Tests proportioning valves	18
	Repairs antiskid braking devices	19

THIS IS A SAMPLE - NOT COMPLETE

WORKSHEET #3

JOB FAMILY _____ D.O.T. # _____

OCCUPATIONAL TITLE _____ U.S.O.E. # _____

DUTIES	TASKS/COMPETENCIES	INSTRUCTIONAL ORDER

SAMPLE SHEET #3.1

JOB FAMILY Automobile Mechanic D.O.T. # 620.281

OCCUPATIONAL TITLE Apprentice Mechanic U.S.O.E. #17.03

DUTIES IN SEQUENCE FOR INSTRUCTION	TASKS/COMPETENCIES IN SEQUENCE FOR INSTRUCTION
0.1 Maintains Suspension, Steering and Tires	1. Changes leaves and springs 2. Replaces complete springs 3. Rebushes spring shackles 4. Rebuilds spring shackles 5. Repairs frame 6. Lubricates chassis 7. Rebushes and renews pivot pins 8. Renews and spaces bearings 9. Overhauls and repairs steering gear 10. Align wheels 11. Removes and replaces power steering pump assembly 12. Services or replaces shock absorbers 13. Repairs, services or replaces tires (mounts and demounts tires, repairs punctures, replaces valves, rotates tires, balances tires)
0.2 Maintains, Repairs and Replaces Brakes	1. Diagnoses brake problems 2. Repairs and replaces brake shoes 3. Turns brake drums 4. Arcs brake shoes 5. Adjusts brake 6. Rebuilds wheel cylinder 7. Repairs and replaces wheel cylinders 8. Repairs and replaces master cylinders 9. Rebuilds master cylinders 10. Repairs, replaces and adjust pressure differential valves 11. Repairs and replaces brake hoses/lines 12. Repairs and replaces disc brake pads 13. Turns brake rotor assemblies 14. Repairs and replaces disc brake caliper units 15. Flushes brake system 16. Bleeds brake system 17. Repairs and adjusts parking brakes 18. Tests proportioning valves 19. Repairs antiskid braking devices 20. Repairs and replaces vacuum power brake units 21. Repairs and replaces air brake units 22. Adds fluid to brake systems.

THIS IS A SAMPLE - NOT COMPLETE

WORKSHEET #3.1

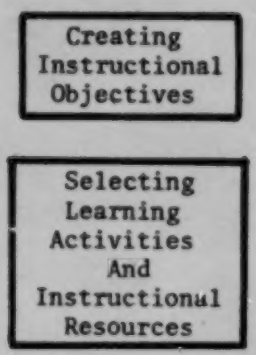
JOB FAMILY _____ D.O.T. # _____

OCCUPATIONAL TITLE _____ U.S.O.E. # _____

DUTIES	TASKS/COMPETENCIES

SECTION III

PLAN NEEDED FOR THE CURRICULUM



CREATING INSTRUCTIONAL OBJECTIVES

Now that we have determined the occupational base for the skills in the cluster, the skills must be reflected in the curriculum. You need to translate the task/competency list developed in the previous unit into instructional objectives.

The terminology related to objectives can be confusing. At this point, it is suggested that you review the Guide to Terminology in Section I of the Manual for terms associated with objectives and curriculum planning.

The objective represents the performance level students must achieve before they can be considered competent. The terms "performance" and "behavioral" are similar; but as vocational objectives are derived from task statements, the term "performance" objective is more commonly used.

In this section, we will attempt to describe the three domains of objectives and the two levels at which they should be written. In a step-by-step process, we will guide you in translating the task/competency statements you have already created, into the performance objective base needed in your instructional program.

More information about objectives is found in Supplement A of this component. It will be helpful to review this material as you write your objectives.

Three Domains

The aim of instruction should be to provide each student with the concepts (or knowing) associated with the occupation, the manipulative skills (or doing) associated with the occupation, and the proper attitudes and values (or feelings) associated with the occupation.

In educational terms, the concepts or knowledge skills required of the occupation are called cognitive learning. The manipulative or doing skills are called psychomotor learning. The attitude, value or feeling skills are called affective learning.

A formal definition and an easy way to relate these terms are as follows:

A. Cognitive - all objectives concerned with the intellectual or mental behaviors of the learner.

B. Psychomotor - all objectives concerned with the physical behavior or manual dexterity of the learner.

C. Affective - all objectives concerned with attitudes, feelings, interests, and values of the learner.

Cognitive	=	Concept	=	Knowing
Psychomotor	=	Skill	=	Doing
Affective	=	Value	=	Feeling

Performance objectives written for vocational job training usually center on the cognitive and psychomotor domains.

Students must be able to demonstrate both factual knowledge and specific skills in a given subject area. What is generally not addressed is the affective domain, and this area should not be overlooked. Vocational

education concerns itself with the training of skilled and competent technicians, with its primary goal being the ability to secure a good job upon successful completion of schooling.

Recent studies of employer needs here in New Hampshire, as well as other states, point out that affective or value learning is most important.

Employers state that attitudes are of primary importance in any job. Foremost are the learners' attitudes toward themselves and the work they are doing. Beyond that, what are the attitudes and feelings toward fellow-workers, authority figures (employers, supervisors, overseers), organizational policies and the consumers to be served? Ethics must be examined as well. A nurse's aide may be capable and efficient in the performance of duties, but if the uniform is wrinkled or if the aide freely discusses details of one patient's case with another patient, this is indicative of non-professionalism, poor ethics, and ultimately, if not corrected, will threaten the job.

It is necessary, then, for every instructor to carefully analyze all three learning domains and develop instructional objectives that reflect each employment need.

Additional information on the three domains is included in Supplement A of this component.

Levels of Objectives

Objectives, when carefully written, will provide you with direction for selecting methods and materials, and a means to determine appropriate evaluation measures for students.

Two levels of objectives are considered useful in stating the performance(s) of the student. The interim objective is the statement of how

the instructor will measure the student during the process of learning. These statements are directly related to the task statements created in the last section. For example, as an Auto Mechanics instructor, you might have the following sample interim objectives for a unit on exhaust systems.

> The student can, to the instructor's satisfaction, do the following:
>
> a. Safely place a vehicle on a hoist
> b. Inspect exhaust system for leaks
> c. Remove defective exhaust parts
> d. Determine needed parts and order
> e. Install new parts

Look familiar? It is quite easy to translate your task/competency list into interim objectives.

The terminal objective is the statement of how the teacher will measure the student at the end of the learning process. These objectives are quite comprehensive and may be related to a combination of task/competencies that make up the duty statements. Using the example of the exhaust system, the terminal objective might be stated as follows:

> Given an automobile and instruction, each student will inspect, list parts needed, order and install any new parts in vehicle exhaust system with 100 percent no leaks, according to manufacturer's specifications.

This type of objective may also look familiar as it may relate to your duty statement written in the last section.

Now that you have an idea of the two levels of objectives, you might ask which is created first. The answer is: either. Some instructors find it easier to describe the end results of a unit of instruction (terminals) and then break it into the various components. Other instructors

prefer to identify all the smaller pieces of an instructional unit (interims) and then write the one or more terminals that result.

Before you get too involved in writing any objectives, ask your department chairperson, vocational director, or State Department consultant where you can obtain instructional objectives in your skill area that may already have been written by others. This does not prevent you from writing some of your own; however, it may provide you with most of your needs. If you already have them, relate them to the information about objectives provided here.

Steps in Objective Writing

Earlier, we discussed the relationship between the duties and task/competency statements and the two levels of objectives. The next steps are related to the Sample Sheets that follow. Perform each step on your own worksheets and you will have:

a. determined titles of instructional units

b. established all interim and terminal objectives for your program.

1. Using your Duties and Task/Competencies worksheet, re write them as shown in Sample Sheet #4.1.
2. Using the Magerian or ABCD Method of writing objectives (explained in Supplement B), or any method you are comfortable with, write the terminal performance objective(s) for each task. Place these in the right hand column of your worksheet (See Sample Sheet #4.1.)
3. When Step 2 is completed for all duties and task/competencies, review

the instructional objectives to determine titles for the instructional units. (Remember, the duty statements may aid you in identifying appropriate unit titles.)

Developing the Instructional Skill Analysis Chart

The next Sample Sheet, #4.2, contains a chart that is quite useful in illustrating the relationship between your selected occupations in the job family and the units of instructional content contained in your program.

To complete this chart, follow the steps below:

1. List the occupations, their D.O.T. and U.S.O.E. numbers in the appropriate columns on the chart. This list is taken from your final cluster created on your worksheet in the Job Family Clustering component. Arrange your list so that the lowest entry occupation is at the top of the sheet.
2. Write your instructional unit titles on the diagonal lines at the top of the chart. If necessary, paraphrase the unit titles to fit on the diagonal lines.
3. Crossreference each occupation listed with each unti title, identifying whether the instructional unit is required or optional for employability. Use R for required and O for optional.
4. As some vocational programs, such as Office Occupations or Agriculture, are taught in more than one course, a block is provided above the unit title to relate the appropriate course title or number to the unit skills.

INSTRUCTIONAL PROGRAM Auto Mechanics

DUTY AND TASK STATEMENTS	PERFORMANCE OBJECTIVES
Duty Statement	Terminal Objective
0.1 Maintains Suspension, Steering and Tires	Each student will, when given a series of automobile suspension, steering or tire problems, diagnose and describe procedure for correcting the problem, identify tools and equipment required, and estimate cost agreeable to manufacturer's and/or instructor's standards.
Task Statements	Interim Objectives
1. Changes leaves and springs 2. Replaces complete spring	Given an automobile with a broken spring or leaf, the student will disassemble, repair and/or replace bushing or other defects so when installed in the spring assembly, it works with 100 percent efficiency.
3. Rebushes spring shackles 4. Rebuilds spring shackles	Given a spring shackle requiring rebushing or rebuilding, the student will disassemble, repair and/or replace bushing or other defects so when installed in the spring assembly, it works with 100 percent efficiency.
5. Repairs frame	Given an automobile with a bent frame, the student will describe the procedure required to put the frame in original condition.
6. Lubricates chassis	Given three different model automobiles, each student will lubricate each vehicle according to the manufacturer's specifications.
7. Rebushes and renews pivot pins 8. Renews and spaces bearings 9. Overhauls and repairs steering gear	Given a malfunction in a power steering unit, each student will remove the unit diagnose the problem, repair, replace and test unit for proper working order.
10. Aligns wheels	Given an automobile with uneven front wheel tire wear, the student will diagnose and adjust the wheel alignment to manufacturer's specifications.

THIS IS A SAMPLE - NOT COMPLETE

WORKSHEET #4.1

INSTRUCTIONAL PROGRAM _____

DUTY AND TASK STATEMENTS	PERFORMANCE OBJECTIVES

WORKSHEET #4.2

INSTRUCTIONAL SKILL ANALYSIS CHART

OCCUPATIONAL CLUSTER: _____

SCHOOL: _____

COURSE

INSTRUCTIONAL UNITS

OCCUPATIONS	D.O.T. NUMBER	U.S.O.E. NUMBER

R = REQUIRED

O OPTIONAL

SAMPLE SHEET #4.2

INSTRUCTIONAL SKILL ANALYSIS CHART

OCCUPATIONAL CLUSTER: _____

SCHOOL: _____

OCCUPATIONS	D.O.T. NUMBER	U.S.O.E. NUMBER	INSTRUCTIONAL UNITS: Orient. & Shop Safety	Related Theory	Preventive Maintenance	Tires and Wheels	Exhaust System	Suspension System	Body Electrical	Charging System	Starting System	Engine Tune-up	State Inspection	Brake System	Steering System	Fuel System	Cooling System	Engine Overhaul	Clutch System	Transmission	Drive Line	Differential	Auto Accessories	Business Management	Human Relations
Service Station Attendant	915.467-010	17.0399	R	R	R	R	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	R
Auto Washer	919.687-014	17.03	R	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	R
Lubrication Servicer	915.687-018	17.03	R	R	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	R
Tire Repairer	915.684-010	17.03	R	R	R	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	R
Service Station Mechanic	620.261-010	17.03	R	R	R	R	R	R	R	R	R	R	R	R	R	R	O	O	O	O	O	O	R	R	
Front End Mechanic	620.281-038	17.0303	R	R	R	R	R	R	O	O	O	O	R	O	R	O	O	O	O	O	O	O	O	O	R
Tune-Up Mechanic	620.281-066	17.0303	R	R	R	R	R	R	R	R	R	R	O	O	O	R	R	O	O	O	O	O	O	O	R
Brake Repairer	620.281-026	17.0303	R	R	R	R	R	R	O	O	O	O	R	R	O	O	O	O	O	O	O	O	O	O	R
Auto Mechanic Apprentice	620.281-012	17.03	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Auto Electrician	825.281-022	17.03	R	R	R	R	R	R	R	R	R	R	O	O	O	O	O	O	O	O	O	O	O	O	R
Transmission Mechanic	620.281-062	17.0303	R	R	R	R	R	R	O	O	O	O	O	O	O	O	O	O	R	R	O	O	O	O	R
Mechanical Maintenance Sup.	638.131-026	17.03	R	R	R	R	R	R	O	O	O	O	O	O	O	O	O	R	O	O	O	O	O	O	R
Air Conditioning Mechanic	620.281-010	17.01	R	R	R	R	R	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	R	O	R
Auto Parts Clerk	222.367-042	17.03	R	R	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	R	R

R = REQUIRED

O OPTIONAL

47

48

SUPPLEMENT A

OBJECTIVES AND DOMAINS

When the objective requires students to use intellectual or mental abilities, we call this a cognitive objective. When the objective requires the student to demonstrate physical behavior or manual dexterity, we call this a psychomotor objective. When the objective requires the student to express attitudes, feelings, interests or values, we call this an affective objective.

In each area - cognitive, psychomotor and affective, there are different levels of response that may be required of the learner. On the charts that follow, the possible response levels are defined for each domain and a list of sample performances is provided.

The levels of response in the charts reflect simple-to-complex learning requirements. It is not always possible for instructors to write an objective and then identify the type and level precisely.

The important issue is for the instructor to be aware of the types and levels discussed; and with this in mind, write objectives that will reflect the students' learning capabilities and the demands of the job skill.

KNOWING = CONCEPT = COGNITIVE

Level	Definition	Performance
1. Knowledge	Recall facts	Can repeat Ohm's Law, Kirchoff's Law
2. Comprehension	Interprets or translates facts	When given E + I, can solve for R (Ohm's Law).
3. Application	Applies principles to single facts	Can build an electrical circuit
4. Analysis	Applies principles to complex facts	Can build a multi circuit system
5. Synthesis	Applies principles to complex facts to formulate a new solution	Can troubleshoot a complex circuit
6. Evaluation	Applies principles to complex facts to formulate a new solution and compares this to other known solutions	Can re design the circuits more efficiently

DOING = MANIPULATIVE SKILL = PSYCHOMOTOR

Level	Definition	Performance
1. Imitation	Observe and copy crudely	Can watch someone ride a bicycle
2. Manipulation	Observe and perform as instructed	Can ride a bicycle (shaky)
3. Precision	Observe and perform precisely as instructed	Can ride a bicycle without shaking
4. Articulation	Observe and perform a series of skills with speed and precision	Can get on bicycle, can ride with ease, can get off bicycle
5. Naturalization	High level of speed and precision becomes habitual	Can get on bicycle, can ride and get off bicycle without having to think about it

FEELING = VALUE = AFFECTIVE

Level	Definition	Performance
1. Receive	Can listen effectively	Student listens to safety lecture
2. Respond	Can listen and react effectively	Student recalls safety facts when needed
3. Value	Can listen and react with a formulated opinion of his/her own	Student recognizes reasons for using safety
4. Organize	Can formulate a set of opinions on his/her own	Student is committed to the use of safety practices
5. Characterize	Can exhibit signs of practice in his/her opinions	Student always uses the correct safety practices

SUPPLEMENT B

OBJECTIVES

A behavioral or performance objective is a statement communicating an instructor's intentions by denoting behavior which a student must demonstrate when he or she has successfully completed a learning experience. The statement should have sufficient detail so that others will interpret the statement the same way the author interprets it.

The chief purposes for stating an objective are:

1. to communicate the author's intentions in clear terms; and
2. to allow the total curriculum to be critically examined.

Two popular methods of writing the behavioral or performance objective are the Magerian Method and the ABCD Method. The Magerian Method (named for its creator, Robert F. Mager) comprises three components:

1. Performance - what the student will be able to do.
2. Conditions - what is given or not given to the student in the course of performing the task.
3. Criterion - the quality or quantity measure of performance.

EXAMPLE: AUTO MECHANICS - UNIT ON EXHAUST SYSTEM

Magerian Method

Performance - Inspect, list parts needed, order and install any new parts.

Conditions - Given an automobile with a defective muffler system, and instruction.

Criterion - 100% no leaks, according to manufacturer's specifications.

In the ABCD Method, there are four components:

1. Audience - usually the student
2. Behavior - what the student will be able to do
3. Conditions - what is given or not given to the student in the course of performing the task
4. Degree - the quality or quantity measure of performance

EXAMPLE: AUTO MECHANICS - UNIT ON EXHAUST SYSTEM

ABCD Method

Audience - Each student.

Behavior - Will inspect, list parts needed, order and install any new parts.

Conditions - Given an automobile with a defective muffler system, and instruction.

Degree - 100% no leaks, according to manufacturer's specifications.

As can be seen by the examples above, either method will provide a statement that is precise and measurable. You must be careful not to use words that have meanings that can be misunderstood. Words or phrases such as the following should be avoided:

understand
appreciate
internalize
to know
to grasp the significance of
to believe

There are others, so exercise some care in choosing your words. Ask yourself if the word will be clear to the student without interpretation. If

it isn't, look for a better word or phrase to describe precisely what is to be accomplished. The following is a list of action verbs having very precise meanings related to specific kinds of learning. Use this list as you create your own objectives.

Specific Responding

(producing a single, isolated response)

to associate
to grasp (with hand)
to identify
to label
to locate
to move
to pick up
to press
to push
to repeat
to respond
to say
to signal
to tighten
to turn
to give a word for
to hold
to indicate
to lift
to loosen
to name
to place
to pull
to recognize
to reply
to rotate
to set
to slide
to touch
to twist

Motor Chaining

(producing a sequence of motions)

to activate
to align
to copy
to (dis)connect
to duplicate
to load
to measure
to operate
to replace
to trace
to turn off
to adjust
to close
to (dis)assemble
to draw
to insert
to manipulate
to open
to remove
to stencil
to tune
to turn on

Verbal Chaining

(producing a sequence of words)

to cite
to enumerate
to list
to recite
to reiterate
to reproduce
to transcribe
to copy
to letter
to quote
to record
to repeat
to (re)state
to type

Discriminating

(identifying two or more stimuli)

to choose
to contrast
to decide
to differentiate
to distinguish
to judge
to mate
to pick
to select
to compare
to couple
to detect
to discern
to isolate
to match
to pair
to recognize

Classifying

(using concepts)

to allocate
to assign
to categorize
to classify
to divide
to grade
to index
to itemize
to rank
to reject
to sort
to survey
to arrange
to catalogue
to characterize
to collect
to file
to group
to inventory
to order
to rate
to screen
to specify
to tabulate

Rule-Using

(using principles)

to anticipate
to calculate
to calibrate
to check
to compile
to compute
to conclude
to construct
to convert
to coordinate
to correct
to deduce
to define
to demonstrate
to design
to determine
to diagram
to equate
to estimate
to evaluate
to examine
to expect
to explain
to extrapolate
to figure
to foresee
to generalize
to illustrate
to infer
to interpolate
to interpret
to monitor
to organize
to plan
to predict
to prescribe
to program
to project
to schedule
to solve
to translate
to verify

Problem-Solving

(combining two or more principles)

to accommodate
to adapt
to adjust to
to analyze
to compose
to contrive
to correlate
to create
to develop
to devise
to diagnose
to discover
to find a way
to invent
to realize
to reason
to resolve
to study
to synthesize
to think through
to trouble shoot

Now let's construct an objective using the Magerian Method. First, identify the performance by name; you can specify the kind of behavior that will be accepted as evidence that the learner has achieved the objective. What is the learner doing when demonstrating that the objective has been achieved?

Example: #1 A. Write a summary
#2 B. Measure the bolt size

Second, try to define the desired behavior by describing the important conditions (givens, restrictions or both) under which the learner will demonstrate competence. What will the learner be provided or denied?

Example: #1 A. Without the aid of references
#2 B. With a micrometer

Third, specify the criterion of acceptable performance by describing how well the learner must perform to be considered acceptable. This may be achieved by:

Time limits
Minimum number of acceptable correct responses

Example: #1 Within a period of 30 minutes
#2 With 100% accuracy

Completed examples:

#1 Write a summary, without the aid of references, within a period of 30 minutes.

#2 Measure the bolt size, with a micrometer, with 100% accuracy.

Using the information presented here, practice writing your own instructional objectives.

SELECTING LEARNING ACTIVITIES AND INSTRUCTIONAL RESOURCES

Learning activities are the methods and media techniques that are used to accomplish the instructional objectives. Remember as you begin this process that there is no single method or media source that has magic for all students. You must decide what source(s) will match the individual student's learning needs, and still best achieve the performance objective.

There are four major considerations involved in selecting the most appropriate methods and media for each student:

SELF-ASSESSMENT

STUDENT ASSESSMENT

FACILITIES AND SCHOOL POLICY ASSESSMENT

SEX BIAS AND SEX-ROLE STEREOTYPING

Self-Assessment

Develop an inventory of your teaching techniques. Determine your strengths and weaknesses in the following areas:

a. Your teaching methods
b. Material you have developed and use successfully
c. Equipment you know how to use and have access to
d. Equipment you do or do not enjoy using
e. Your classroom organization
f. Other relevant areas
g. Adapting to changing needs and equipment with which you may be unfamilar.

Student Assessment

Your activities must reflect student learning styles, interests, personality and attitudinal characteristics, and prerequisite learning achieved. Age and reading ability should also be considered. The following are student

characteristices you will want to consider.

A. Classroom

To what extent is each student interested in the subject and class activities? If the interest is low, why? What is the student enthusiastic about in his or her work? Is the student's interest level the same in your class as in other classes? What are the non-classroom activities of your student?

B. Problems

Students have a variety of problems with school, social situations, economic conditions, family and emotional situations. Think of each of your students and list any major problems of which you are aware.

C. Attitudes

Describe your students' positive and negative attitudes toward each of the following:

a. peers in your class
b. instructor's progress
c. academic progress
d. the subject you will be teaching
e. other relevant areas

D. General Information

a. what is the age of each student?
b. what is the reading ability or level of each student?
c. if there are key prerequisite skills needed by your class, describe each student's mastery of them.
d. is each student able to work independently?
e. does the student have any physical disabilities which might affect performance in your class?
g. other relevant areas.

E. Learning Style

a. does the student learn best by using visual materials (e.g., pictures, charts, graphs, etc.)? (seeing)
b. does the student learn best by using audio materials (e.g., tape recordings, listening to a lecture, etc.)? (hearing)
c. does the student learn best from his or her conversing? (speaking)
d. does the student learn best by using audio-visual materials (e.g., film, slide-tape presentations, TV, etc.)? (hearing, seeing)
e. does the student learn best from using touch, taste, etc.? (tactile)
f. does the student learn best by reading?
g. does the student learn best by hands on experiences? (manipulative)
h. does the student learn best by paper and pencil activities? (writing)

See chart (supplement A this section) which relates these learning styles to the methods and strategies presented. (P. 61)

Facilities and School Policy Assessment

You are limited by the facilities and media available. Budget, time and school policy limitations are probably the most important aspects. Some of the facility and school policy concerns are listed below:

A. Administrative

a. field trips
b. policies governing requisitions

B. Time

a. length of class period and number of meetings (per week? semester? year?)
b. non instructional time available for instructor to develop materials.

C. Equipment and Space

a. equipment available in school or district
b. space for specialized use (e.g., small group discussions, lab work, etc.)
c. appropriateness of facilities (e.g., electrical outlets, darkening shades, quiet study areas, etc.)

D. Basic and Supplementary Resources

a. software - texts and other reference materials available in classroom, resource center and possibly community library
b. availability of modular or programmed instructional materials
c. individual workbooks associated with texts.

Sex Bias and Sex-Role Stereotyping - A New and Important Assessment

The three types of assessment described previously should be supplemented with a fourth type that affects written text and resource materials that may be used. Sex bias and sex-role stereotyping need to be assessed.

The following checklist will help you to select written materials appropriate to allow students to expand and balance the images of both sexes. This list is by no means complete; however, it should provide you

with some basic guidelines. Additional information may be obtained by contacting the Equal Access Consultant at the State Department of Education.

CHECKLIST

Do the media involved make both female and male students feel comfortable in learning about subjects which were formerly for one sex?

Do the media make a special effort to include pictures of male and female students, teachers, and adults in non-traditional roles?

Do learning activities and projects avoid sex stereotyping according to past traditional roles?

Do the media point out that employers in occupations which formerly hired one sex are now required by law to employ the best qualified candidate regardless of sex?

Do the media for traditionally female occupations, such as health service or secretarial work, demonstrate that males have the right to pursue these occupations?

Do media on family relations, child care, housing, foods and nutrition, clothing selection, construction and design and management stress the personal needs of both males and females?

Do media for mechanical drawing, metals, plastics, electronics, woodworking, construction, machinery and agriculture point out to both males and females the advantages of acquiring training for the labor market and practical skills for daily living?

Do media dispel the myth that tools and power-driven machines are too dangerous for females to learn to use?

Do media demonstrate that females have the right to pursue activities or careers in non traditional skills where physical strength is required?

The following questions refer to audio-visual materials:

Does the title have male or female connotation?

Is narration by male or female voices, or both?

Does the audio reflect male or female bias?

Do visuals portray males more often than females, or the other way around?

Are the main characters male or female?

In occupational settings, are adults seen predominantly male or female?

In school settings, are adults seen predominantly male or female?

Are characters cast in independent roles (making decisions, acting autonomously) predominantly male or female?

Are characters cast in aggressive roles (being competitive, dominating or leading) predominantly male or female?

Are characters cast in subordinate roles (being passive or acting under another's influence) predominantly male or female?

SELECTING THE ACTIVITIES

The next few pages are devoted to a list of methods or strategies that are commonly used by instructors to accomplish instructional objectives. Additionally, a chart relating the methods to the various learning styles described on page 61 is included as Supplement A of this component. Keeping in mind the four basic assessments presented here, review the list. Following your review, turn to Sample Sheet #5, which follows the Methods or Strategies list. Use the space titled "Worksheet" or create your own worksheet. In the left column, write the instructional unit title. In the middle column, write the interim instructional objective (taken from your "Objectives" worksheet.) In the right column, write the title of the learning method or strategy selected for the accomplishment of the objective.

When you have completed this, turn to the next section which discusses Evaluation.

LIST OF METHODS OR STRATEGIES FOR CLASSROOM USE

Definition	Use
AUDIO-VISUAL MATERIALS	
an organized visual and audio presentation of information (software) that usually requires equipment (hardware) such as a 16mm film projector.	can be used by individuals, small and large groups; can be locally produced by instructor or student; can be commercially produced; presents photographic reproduction of reality, enlargement of small print or pictures, provides for a variety of approaches; encourages active participation; varied learning activities stimulate high interest, lengthen the attention span and promote persistent effort.
BRAINSTORMING	
group inter action which allows individuals to express their opinions to the group without fear of criticism, to present ideas or to re think previous ideas.	usually involves small group; permits differences of opinions; can lead to a plan of action; may have some time limitations.
CASE STUDY	
a method of gathering information or researching about a certain person or situation.	provides for background information; usually involves small groups or an individual; can use interview techniques; may utilize visual devices, e.g., pictures, charts.
COOPERATIVE WORK EXPERIENCE	
accomplishment of instructional content through actual job performance.	exposes student to learning experiences not feasibly accomplished in the school environment.
DEMONSTRATION	
an organized planned performance of procedures and processes having at least two parts: a short preparatory period during which the purpose(s) of the demonstration is presented; and	may be used to demonstrate new skill experiments, etc.; may be for large and/or small groups; may be for an individual; may be for varied periods of time; may be presented by

	Definition	Use
	the actual performance which can include a verbal explanation.	the instructor or student(s) or both; may have follow-up period for practice of the process or procedures demonstrated; may use audio-visual materials.
DISCUSSION	group interaction in which individuals can express ideas, opinions and thoughts - even if not popular; listen to opinions of others; provides a means of seeking the ideas and judgments concerning the topic.	allows for differences of opinions; can be large or small group; no time limitations on discussion; provides opportunity for getting to know students; can follow a lecture; can stimulate new interests.
DRILL	repetition of concepts, words, mathematical formulas, and so forth until they are memorized.	can be large group, small group or individual; may be either verbal or written; involves student response; can utilize other students in class.
FIELD TRIP	the opportunity to visit the resources in the surrounding community that are associated with the skill development process.	gives students direct experience with their chosen skill area; may lead to further interest, studies or projects; may be used with large or small groups.
GROUP WORK	a method of classroom organization in which a small group of students (usually 10 or less) with mutual learning objectives, assemble in a suitable place for a predetermined length of time; instructor serves as coordinator and/or leader; group's work must contribute to the total activities and objectives for the large group.	used so that groups may either receive instruction, work together on a project, or interact in a non-directive manner to examine and discuss a mutual problem or situation.
GUEST SPEAKER	usually an available expert on material in a specific subject area.	usually for large groups; can assist in career decisions; usually informative and inexpensive; provides for better understanding of employer needs.

Definition	Use
MODULES/LEARNING PACKETS	
a sequential written or audio presentation of learning experiences based upon stated performance objectives; learning experiences are coupled with specified management procedures which allow for self-pacing, individual conferences with the instructor regarding progress and alternative assignments and/or materials, depending on individual characteristics and/or interests.	to accomplish non-sequential or sequential skills with little or no instructor involvement; good for educating students in self-reliance.
LECTURE	
an organized, verbal presentation of information.	can be used to introduce a unit of study; can be used for summarizing a problem for study; can provide information which is difficult for students to find themselves; involves some length of time (at least 15-20 minutes); may use visual devices.
OPEN LAB SEQUENCES	
teaching student skills or concepts through a self-instructional process that is sequenced to result in a specific knowledge; student reads directions and performs activities step-by-step until objective is accomplished.	supplements organized classroom learning; usually, participation is optional for the student; however, it may be used as a requirement.
PANEL DISCUSSION	
usually involves 3-7 students interacting on a central topic; provides a chance for members of the class to ask questions and/or make comments; refer to DISCUSSION for other characteristics.	creates a situation where interaction is suggested, if not demanded.
PROJECTS (TERM PAPERS, PROTOTYPES, RESEARCH PROJECTS, MODELS)	
a chosen or assigned topic in which the student researches and presents	provides a chance for the student to express his or her ideas and thoughts;

	Definition	Use
	the information to the instructor or to the class; can use audio-visual devices to present project.	provides an opportunity for the student to research a variety of topics; can create new interests; presents possibilities for researching the community, i.e., finding available resources, interviewing leaders in the community, and so forth; can improve communication skills of the student; reinforces hand skill development.
QUESTIONS AND ANSWERS	a period of time designated for content clarification and amplification with student-generated questions.	provides for clarification of new learning; responses can come from either the instructor and/or other students; time period for questions should last at least 15 minutes.
REVIEW/REINFORCEMENT	an organized summary (using a variety of approaches) of key points of content which follows instruction.	may be verbal or written; may involve activities such as student practice, group projects; may be a short summary at the end of a lecture; may last longer than one class period; may be preparation for a test; involves student responses; can use a variety of visual devices.
ROLE PLAYING	the practice or experience of being someone else; instructions can be provided as to how to play the role.	provides opportunity for student to increase insight into how a person may feel in a given situation; can provide data for an observing group; may be done with small or large group; may have time restrictions; can be fictitious role in which player is seeking to acquire an understanding of relationships or actions; has value for inter personal and self-assessment development.

Definition	Use
SIMULATION GAMES	
a model or caricature containing a representation of reality (simulation) which utilizes role-playing and a game structure, with rules of play and a method of determining a winner or winners.	can present reality in a classroom; provides student an opportunity to cope with unpredictable circumstances; can teach social interaction; can involve large group, small group or individual; has time constraints illustrate the relationship between decision making and its consequences; is extremely flexible; i.e., rules can be changed.
TEXT OR REFERENCE ASSIGNMENT	
usually reading and/or completing questions relevant to the topic of study.	can be used as a pre-introduction to a new skill; usually followed by lecture, demonstration and/or discussion.

SAMPLE SHEET #5

INSTRUCTIONAL UNIT TITLE	INTERIM OBJECTIVE (Identify by number or write out the objective)	LEARNING METHOD
	SAMPLE	
Suspension, Steering and Tires	Given an automobile with uneven front tire wear, the student will adjust the wheel alignment to manufacturer's specifications, and explain the adjustments made.	Text Assignment Lecture Demonstration Discussion Project
	WORKSHEET #5	

RELATING STUDENT LEARNING STYLES TO LEARNING METHOD SELECTION

CODE

- ■ Learning style (usually) included in this learning method.
- ◻ Learning style may be included (optional) in this learning method.
- ☐ Learning style not included in this learning method.

Learning Method or Strategy	Seeing (Visual)	Hearing (Auditory)	Speaking (Verbal) (Oral)	Writing	Manipulative (Doing)	Tactile (Touching)
Audio Visual Materials	■	■				
Brainstorming			■			
Case Study		■		◻		
Cooperative Work Experience	◻	◻	◻	◻	■	■
Demonstration	■	■				◻
Discussion		■	■			
Drill	◻	◻	◻	◻		
Field Trip	■	■	■			
Group Work		■	■	◻	◻	◻
Guest Speaker	■	◻				
Modules/Learning Packets	■	◻	◻	◻	◻	◻
Lecture		■				
Open Lab Sequences	■	◻	◻	◻	■	◻
Panel Discussions		■	■			
Term Papers				■		
Prototypes	■				■	◻
Models	■				■	■
Research	◻	◻	◻	◻	◻	◻
Questions and Answers		■	■	◻		
Review/Reinforcement	◻	◻	◻	◻	◻	◻
Role Playing	■	■	■		◻	◻
Simulation Games	◻	◻	◻	◻	◻	◻
Text/Reference Assignments	■			■		

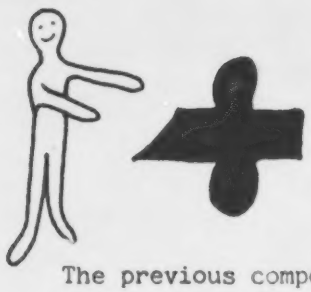
PROJECTS

SECTION IV

CREATING THE OUTPUTS

Developing Evaluation Techniques

Designing Effective Recordkeeping



DEVELOPING
EVALUATION
TECHNIQUES

The previous components of the instructional system have enabled you to:

a. identify and prescribe for your students what they must know or do regarding job entry level skills (TASK/COMPETENCY ANALYSIS and INSTRUCTIONAL OBJECTIVES);

b. provide students with an activity base from which to learn the skills (LEARNING EXPERIENCES AND INSTRUCTIONAL RESOURCES.)

The final and most important question is: how do you know whether the teaching and learning have been effective? To realistically determine this, your evaluation process must be related to the original performance objectives or criteria. It is important here to distinguish between criterion-referenced evaluation and the more commonly used norm-referenced evaluation.

> Criterion-referenced measures assess a student's performance in relation to a specific criterion or minimum competency standards. Norm-referenced measures assess a student's performance in relation to those of other students, with the same measuring device being employed for all students.

To help clarify these definitions, let's look at the following sample instructional objective:

> The student when asked to locate 10 or more automobile replacement parts in given catalogues will do so with 90% accuracy.

If, when evaluating the student on a post-test, the instructor demands 90% accuracy from each student and records the student as having met that

standard, this is called criterion-referenced testing. If, however, a student's grade is determined by comparison with other students' and varies from 70% to 100% accuracy, this is called norm-referenced testing. Criterion-referenced testing, therefore, uses an absolute standard of quality, whereas norm-referenced testing uses a relative standard.

There is no way to tell a criterion-referenced test from a norm-referenced test by looking at the test. There is no reason, however, why a criterion-referenced test cannot be used as a norm-referenced test to eventually discriminate between students' level of mastery of objectives. In fact, this is usually necessary because of the grading required by most school systems.

Many instructors feel that a criterion-referenced evaluation conflicts with the letter grade system. This is not the case. The instructor sets the minimum quality and quantity standards to be accomplished for each objective, and the minimum competency level then represents a passing grade. Higher grades may be earned by performances that are above the requirements for minimum competency or by the accomplishment of more objectives.

If the instructional objectives are written relative to minimum employment standards for that occupation, then it is vital that each student be measured against that standard. Once that has been accomplished, the instructor can, if needed, develop a student-to-student comparison (norm-referenced) from which to compute grades.

Student comparisons can be made by measuring the following:

1. the number of attempts the student has to make before accomplishing the minimum standard
2. the amount of time the student takes to accomplish the standard

3. the difference in quality, above the standards, achieved by specific students

4. the number of instructional objectives completed over a given time frame (such as a marking period).

The next part of the Evaluation component discusses the types and methods that can be used to evaluate student performance.

TYPES AND METHODS OF EVALUATION

Instructors should evaluate students to determine if each can perform any given skill of an occupation at the standard acceptable to employers. Instructional objectives should reflect these standards.

If the student can perform at the minimum acceptable competency level, the instructor can be assured of the following:

a. desired learning has taken place; and

b. instruction provided the student during the learning process was effective.

Evaluation can be accomplished in a variety of ways. It also can (and should) be conducted a number of times throughout the learning process. Below, we have attempted to describe the four most commonly used types of criterion-referenced evaluations. A good instructional program will make use of all four.

Types of Evaluation

1. BEFORE LESSON/UNIT - Pre test

This type of evaluation is diagnostic and prescriptive in nature. It allows the instructor and student to recognize, measure and incorporate the student's previous knowledge of the subject matter contained in a given lesson or unit. Strengths and weaknesses can be pinpointed and, if necessary, appropriate modifications in curriculum made to meet the needs of the student.

2. WITHIN LESSON/UNIT

A. Feedback - This type of evaluation furnishes the student with feedback at designated times throughout the course of the lesson or unit. It is built into the structure of the curriculum.

B. Reinforcement - This is similar to Feedback, but its primary purpose is to reinforce the student's confidence in his or her capabilities to go on to closely related advanced learning.

3. END OF LESSON/UNIT - Post test

This type of evaluation provides both the instructor and student with a prediction of the student's ability to successfully move on to the next learning experience. The new learning experience may or may not be sequential.

4. END OF COURSE - Final

This type of evaluation is comprehensive and is useful in determining how successfully the student will be able to apply what he or she has learned to on-the-job situations. It is also helpful in predicting student performance in advanced courses.

Methods of Evaluation

The choice of the evaluation method should be determined by the learning activity involved in the accomplishment of the instructional objective.

If a student's learning activities are primarily research, reading or answering assigned questions (usually referred to as the "knowledge" base), a paper and pencil test may be the most appropriate form of evaluation.

If, however, lab processes or "performance" learning activities are the prime modes of learning, then an observation checklist, rating scale or similar method may be the most appropriate form of evaluation.

In any skill evaluation, both the knowledge and performance methods are required. A student whose objective is to operate a bulldozer, circular saw or milling machine might be able to describe the process, name

the parts and so forth. The real competency, however, is in the operation of the equipment. A performance test, therefore, must also be given.

Listed below are descriptions and brief examples of common methods of evaluation.

1. Oral or Written Questions

Instructors use this method extensively. It should be used when the instructional objective and learning activities require the student to state factual answers to knowledge questions. Examples of this method are:

a. True-false
b. Sentence or phrase completion
c. Multiple choice
d. Matching
e. Short answer (usually two sentences or less)

2. Problem Solving

When the instructional objective and learning activities have required the student to assemble facts and determine the proper procedure or formula, the problem solving method of evaluation is appropriate.

An example of a problem solving test question might be:

Translate the following series of English measurements into metric equivalents:

1 inch	1 yard	$6\frac{3}{8}$ inches
1 foot	9 inches	$14\frac{1}{2}$ inches

Problem solving can be a written or performance test.

An example of a performance test question using the problem solving method might be as follows:

Using the tools and test engine provided, determine the malfunction in the electrical system, repair it and run the engine.

3. Comparative or Choice

When the instructional objective and learning activities indicate the student's need to compare or choose the best alternative process, this method can be used. Usually, students have to recall a series of facts analyzing and evaluating a given situation to derive the

most appropriate answer. This method is generally in written form; however, it can be designed as a performance test.

Which of the following layout methods would be appropriate to form a square-to-round duct, and describe the process you would use:

a. Radical Line
b. Parallel Line
c. Triangulation

4. Observation Checklist

When the performance criteria suggest that the instructor measure whether the student can or cannot do something and a quality rating is not required, an observation checklist is appropriate. This method is used most effectively with affective learning.

Example:

The student:

-- is a self-starter
-- can finish a task independently
-- can work through a process
-- can follow oral directions
-- can work with small or large groups

5. Rating Sheet

This method is used when it is important to determine not only minimum competency, but also the level above minimum competency that the student has achieved.

Example: Drilling holes in wood to accept a flathead woodscrew

Process	L	M	S
1. Identifies appropriate woodscrew for size and shape of wood.	☐	☐	☐
2. Identifies correct size and shape of woodscrews using a wire gauge.	☐	☐	☐
3. Selects appropriate pilot hold drill.	☐	☐	☐
4. Selects and uses appropriate countersink.	☐	☐	☐

A sample check mark indicating pass-fail may be used or, as in the example, use of L (Limited), M (Moderate) and S (Superior) helps to further define the level of student competency.

6. Contract Agreement

This is generally used for learning activities that require an extensive amount of time. It includes the objective(s), materials and resources to be used, the plan of accomplishment and the time agreement. All evaluation standards are discussed between instructor and student and should be written into the agreement.

Example:

CONTRACT AGREEMENT

Objective

Materials and Resources Required

Student Plan

Completion Date

Evaluation Standards

Completion Date

Teacher Signature _____ Student Signature _____

Date Completed _____ Instructor's Signature _____

Comments _____

_____

_____

Grade _____

Now that you have an understanding of the basic types of evaluation that are possible, you must relate these to the objectives and learning activities you have established earlier. Using the example created in the component on Selecting Learning Activities and Instructional Resources, the evaluation methods are selected. When you have reviewed the sample sheet #6 below, review your own sheets created in the Selected Learning Activities and Instructional Resources component. Using the Worksheet #6 that follows on the next page, determine your evaluation techniques for each selected learning activity.

SAMPLE SHEET #6

Instructional Unit Title	Interim Objective	Learning Activities	Evaluation Method
Suspension steering and tires	Given an automobile with uneven front tire wear, the student will adjust the wheel alignment to manufacturers specifications and explain the adjustment made.	Text Assignment Lecture Demonstration Discussion Project	Written test or quiz. Observation Checklist Rating Sheet

WORKSHEET #6

Instructional Unit Title	Interim Objective	Learning Activities	Evaluation Method

DESIGNING EFFECTIVE RECORDKEEPING

The last section described the necessity of evaluating students on the basis of criteria or objectives accomplished. Good recordkeeping should provide the instructor with the means to determine each student's ability to accomplish objectives. Specifically, the recordkeeping system can be used to identify:

a. Student mastery of a given objective
b. Objectives currently being accomplished by student
c. Objectives not yet attempted by student
d. Potential difficulties student may have in achieving objective(s)
e. Level of mastery; e.g., limited, moderate or superior
f. Number of student attempts at mastery
g. Time required to gain mastery
h. Instructor validation of student mastery of objective

Recordkeeping of student progress can be very time-consuming. For those instructors who feel that each of the above elements must be personally recorded, it is going to be more time-consuming than the traditional rank-book approach associated with the norm-referenced evaluation described in the previous unit.

By this time, you probably recognize the need to transfer more responsibility for student learning to the student. Why shouldn't the student have more responsibility in recording his or her own progress. In the list of recordkeeping needs, we have identified only three types of records that must be instructor maintained. The instructor must:

a. Validate the student's mastery of objectives

b. Determine the level of mastery of the objectives

c. Determine the possible potential difficulties in mastering the objectives.

The remaining items can be recorded by the student, thereby removing considerable time constraints from the instructor.

Obviously, there is no one recordkeeping system that will satisfy the needs of all instructors. Each instructor has an obligation, however, to record:

a. the student's progress through the instructional objectives; and

b. the cumulative skills acquired at the completion of the program.

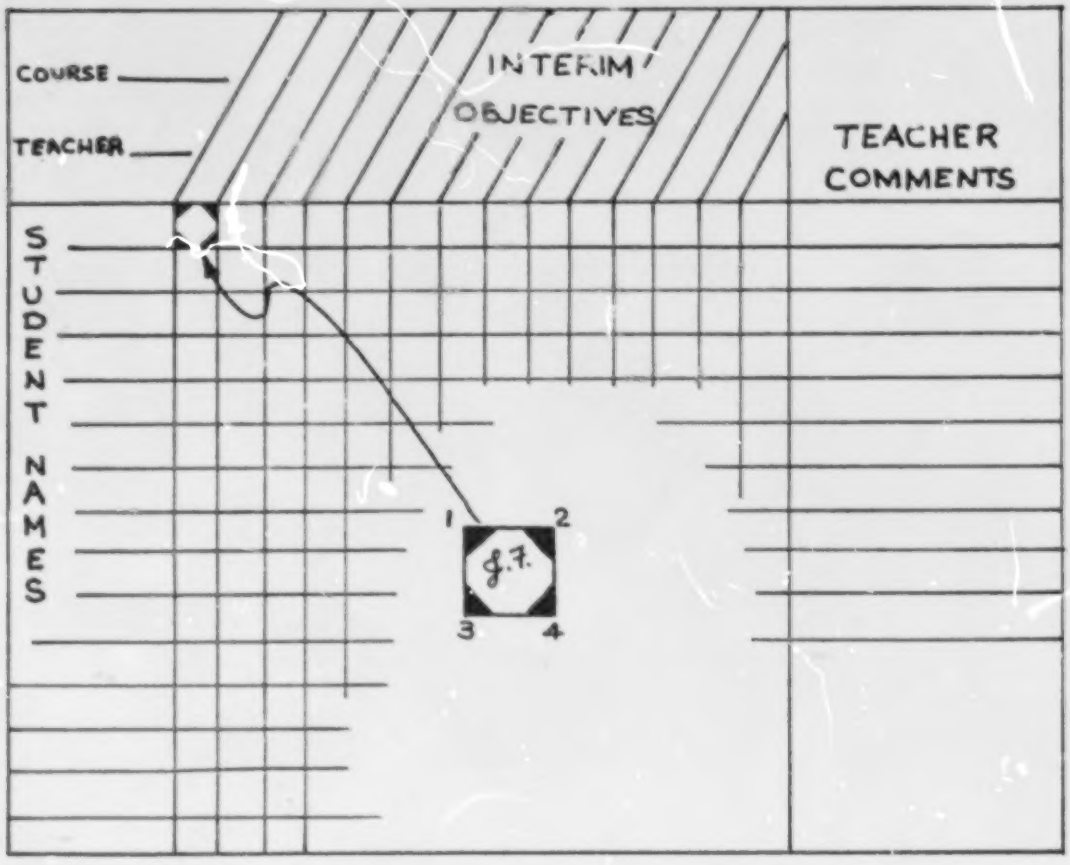
The remainder of this component provides you with three alternative examples of recordkeeping during the instructional process.

TYPE 1	Class Record
TYPE 2	Individual Record
TYPE 3	Project Evaluation Record

In addition, there is an example of a record indicating the student's cumulative skills upon completion of the program. This particular example is called an Occupational Readiness Record.

TYPE 1

A chart may be placed on the wall of the classroom. All student names are recorded alphabetically on the left.



Interim objectives, related to a unit objective sheet, are either numbered or paraphrased and placed along the top of the chart.

Each box has marks as shown. Mark 1 is recorded when the student initiates work on the objective. Mark 2 is recorded when the student has completed work on the activities associated with the objective. Mark 3 is recorded when the student has completed the performance evaluation. (Note: Marks 1, 2 and 3 are recorded by the student.) Mark 4 and the instructor's initials are recorded by the instructor.

TYPE 2

The chart described in Type 1 may be developed for each student and kept in a personal file folder. This folder is accessible only to the instructor and the individual student.

STUDENT _____	TEACHER _____						COURSE _____
OBJECTIVE	1	2	3	4	5	6	
	9/25	10/6	10/11	10/20	M	J.T.	COMMENTS

Although Types 1 and 2 are similar, the latter allows for confidentiality. This can be quite important in programs that emphasize affective learning. (See chapter on Objectives.) This type also allows the instructor to utilize candid comments. As in Type 1, the objectives are numbered and/or paraphrased on the left side of the chart. The student's name is written at the top. Column 1 indicates student initiation of the objective. Column 2 indicates completion of the activities. Column 3 indicates completion of the evaluation and Column 4 indicates instructor's validation. Notice that dates are used to record activities. This, rather than the symbolic marks used in Type 1, provides a better means of recording any degree of student difficulty encountered with a given objective. Column 5 can be used to establish the level of mastery. In this case, we are using three levels:

L = Limited

M = Moderate

S = Superior

Column 6 can be used as a sign-off column for the instructor.

TYPE 3

This form was developed by a Food Service program instructor. You will notice it has the same components described in Types 1 and 2, but contains more detailed information that can aid the instructor in arriving at a grade to accommodate school policy.

STUDENT PROGRESS AND EVALUATION FORM

STUDENT: _____

UNIT: _____

EVALUATION

PROJECTS	RECIPE #	QUALITY STANDARDS	TECHNIQUES	TIME	APPEARANCE	COLOR	CONSISTENCY	DONENESS	SHAPE	TASTE	TEXTURE	PROJECT AVERAGE	TRAINING STANDARDS	TEACHER SIGN OFF

READINESS CARD

One or more of the three examples of recordkeeping described here are utilized and maintained throughout the instructional process.

Instructors having experience with recordkeeping have found that any one of the described methods can also provide the student with an excellent permanent record that can be forwarded to employers.

The sample below is called an Occupational Readiness Record.

OCCUPATIONAL READINESS RECORD

TO THE EMPLOYER

This occupational readiness record is both an inventory of the training course content and level of proficiency or achievement demonstrated by the graduate. Potential employers can obtain information about skills and knowledge the student has obtained by writing St. Johnsbury Academy. As a part of his training, the graduate has learned to expect appropriate instructions with each assigned task. He will expect and seek supervision, assistance and direction where appropriate. Note that the job tasks as identified, are basic to the next higher or more sophisticated job level. Work experience and further training may qualify the graduate for more complicated tasks, a new job title and higher pay.

KEY TO PROFICIENCY CODE

Level L **Limited Skill**—does simple parts of task using required tools, but requires instruction and supervision to do most parts of the job.
Level M **Moderate Skill**—requires help on some parts, but can use most tools and special equipment needed. Knows work procedures but may not meet minimum demands for speed or accuracy.
Level S **Skilled**—understands operating principles and accomplishes all parts of task with only spot checks of finished work. Meets minimum demands for speed and accuracy.
All graduates receiving this document have satisfactorily demonstrated to the training staff their ability to work safely, understand and carry out instructions, and cooperate with other employees. This document also attests to their punctuality, reliability and general work habits.

ST. JOHNSBURY ACADEMY
St. Johnsbury, Vermont

L	M	S	
☐	☐	☐	Introduction/Safety
☐	☐	☐	Equipment Use/Care
☐	☐	☐	Techniques
☐	☐	☐	Lettering
☐	☐	☐	Geometric Construction
☐	☐	☐	Multi-View Drawings
☐	☐	☐	Isometric Drawings
☐	☐	☐	Section Views
☐	☐	☐	Descriptive Geometry
☐	☐	☐	Auxiliary Views
☐	☐	☐	Developments
☐	☐	☐	Basic Dimensioning
☐	☐	☐	Mechanical Drafting
☐	☐	☐	Materials
☐	☐	☐	Castings
☐	☐	☐	Weldings
☐	☐	☐	Springs
☐	☐	☐	Master Parts List
☐	☐	☐	Dimensioning—Advanced
☐	☐	☐	Precision Measuring
☐	☐	☐	Fasteners
☐	☐	☐	Basic Electronic Drafting
☐	☐	☐	Identification of Components
☐	☐	☐	Basic Functions of Components

L	A	S	
☐	☐	☐	Schematic Drawings
☐	☐	☐	Basic Technical Illustration
☐	☐	☐	Leroy Lettering
☐	☐	☐	Isometric Views
☐	☐	☐	Perspective Drawing
☐	☐	☐	Air Brush Work
☐	☐	☐	Civil Drafting/Surveying
☐	☐	☐	Kinds of Maps
☐	☐	☐	Stereoscope Study
☐	☐	☐	Plotting
☐	☐	☐	Chain Practice (Field)
☐	☐	☐	Plotting w/ Transit
☐	☐	☐	Topographic Map Drawing
☐	☐	☐	Topographic Field Work w/Level
☐	☐	☐	Architectural Drafting
☐	☐	☐	History of Architecture
☐	☐	☐	Major Considerations
☐	☐	☐	House Construction
☐	☐	☐	Doors/Windows/Fireplace/ Study
☐	☐	☐	Stairs
☐	☐	☐	Floor Plans Layout
☐	☐	☐	Elevations
☐	☐	☐	Pictorial View

VOCATIONAL DRAFTING

Name

Soc. Sec. No.

Length of Training

Certified by
Instructor

PROMPTNESS

Usually Prompt	Almost Never Late	Always Prompt

RESPONSIBILITY

Not Very Reliable	Assumes Responsibility	Exceptionally Reliable

INITIATIVE

Needs Considerable Supervision	Needs Little Supervision	Always Finds Extra Work To Do

APPLICATION

Indifference	Average Application	Puts Extra Effort Into Work

ACCURACY

Often Inaccurate	Better Than Average	Rarely Makes Mistakes

At the completion of the occupational training program, the instructor completes the card. Usually, a minimum of three copies are created. One card is given to the student for use in job interviews. One is placed in the student's permanent records, and the final copy is kept by the instructor for future use in providing student recommendations to employers.

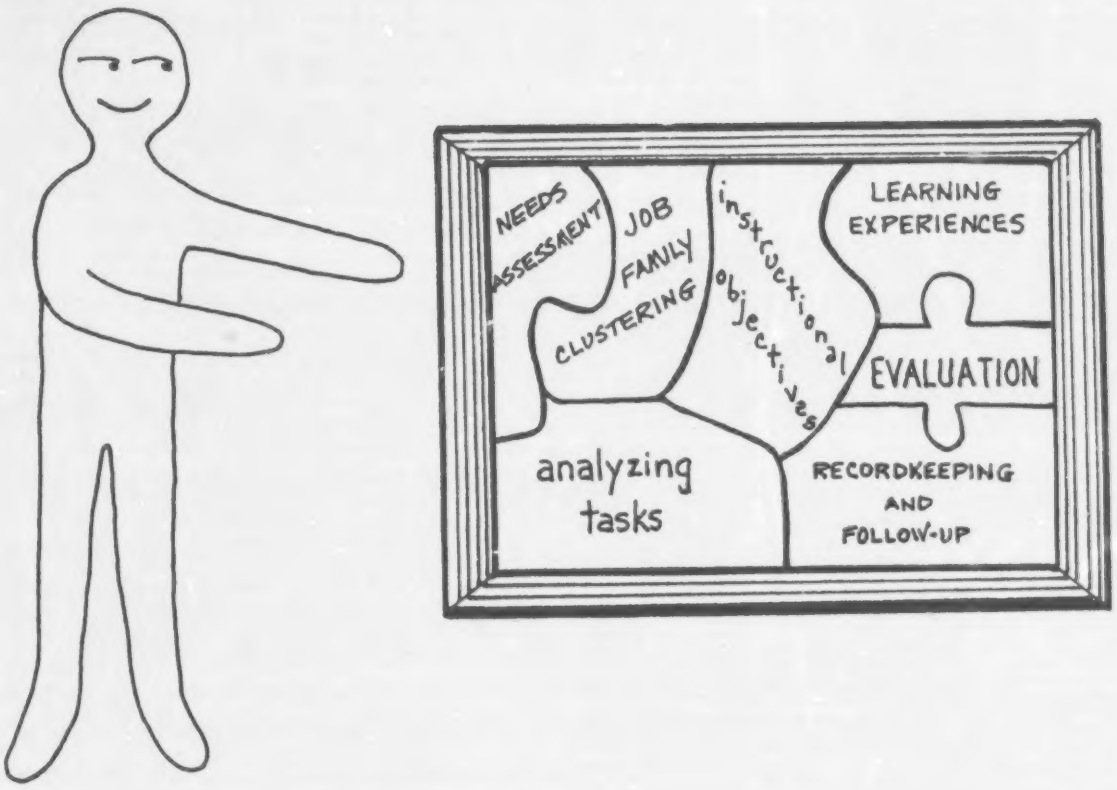
Notice that the Readiness Record not only provides information on the skill competencies of the student, but also includes the student's attitudinal characteristics.

As stated initially in this section, there is no one system that can accommodate every instructor or program. What has been provided here is an explanation of the recordkeeping component and its relationship to a good instructional program. Using the information here, design your own recordkeeping system.

In this component we have discussed the value of recordkeeping and provided you with various sample forms. Rather than provide any single form for recordkeeping, you are encouraged to review the samples and design your own. As stated previously, two types of forms are most useful: first the daily or weekly recordkeeping related to the competency based learning objectives the student attempts to master; second, the occupational readiness record that determines the level of occupational skill mastery achieved at the conclusion of the program. It is suggested that you design and use both.

Regarding the daily or weekly record, it is suggested that this may supplement the students grade report form at the end of each marking period. The occupational readiness record completed at the conclusion of the instructional program may be presented to the student at the completion of the program. The student may find this documentation of skills training very useful in employment interviews or to acquire advanced placement in further occupational training. It is suggested that instructors make copies of both types of recordkeeping for the following purposes:

1. Student's permanent school folder.
2. Parents of student.
3. Student for employment purposes.
4. Instructor's file for future references.
5. Guidance counselor use.



PUTTING THE PIECES TOGETHER!

SECTION V

PUTTING THE CURRICULUM COMPONENTS TOGETHER

At the beginning of this manual, it was indicated that curriculum has two purposes. First, it is a plan for establishing the student and instructor roles in the skill development process. Second, it is to communicate to other interested people what is being accomplished in the instructional program. You must keep these two purposes in mind as you assemble your curriculum.

The curriculum components were divided into three parts: Inputs, Plan, and Outputs. Below are items from each part that should be found in a curriculum, as well as a series of suggestions as to their sequence and form.

Part 1 INPUT

A. Current job needs in the local, regional and possibly the national employment market

Data collected in the Needs Assessment component should be written in a narrative form. This information should appear first in the curriculum.

B. Titles and descriptions of jobs selected for the instructional program

Job titles and descriptions derived from the Job Family Clustering component should appear next in the curriculum. These sheets should be titled and referenced according to the Dictionary of Occupational Titles (D.O.T.). The actual job descriptions may be copied from the D.O.T., if applicable; or you may adapt such descriptions to your needs by putting the definitions in your own words.

C. A list of competencies students will be responsible for in the instructional program

This list should be derived from the duties and task/competency statements as described in the Analyzing Tasks component.

D. Skill Analysis Chart

The chart showing the occupational titles and instructional skill units developed in the Creating Instructional Objectives component should be included at this point.

Part 2 PLAN

A. Terminal and interim instructional objectives

B. Alternative learning activities

C. List of evaluation methods related to instructional objectives

These three items should be derived from the Creating Instructional Objectives component, the Selecting Learning Experiences component and the Developing Evaluation Techniques component.

These may appear on separate sheets; however, as they are relevant to each other, it is suggested that they be assembled together on a three-column document. This document is particularly suitable for use by the student, as it presents, in a clear and concise format, the work that is entailed in any given unit of instruction. A sample of this style of composition is shown here. Use it or your own variation.

PROGRAM _____

UNIT _____

TERMINAL AND INTERIM OBJECTIVES	ALTERNATIVE LEARNING ACTIVITIES	EVALUATION METHOD

Also shown is an item that is useful, if not a must for the instructor. This consists of a lesson or unit plan related to the interim objectives that describes the sequence of instruction, the instructor's role and the resources required to carry out the instructional activities.

It is shown here separately as the information it contains is not directly relevant to student needs. The information on this sheet, however, may be combined with the three-column sheet described previously. This sheet or your variation should be used.

PROGRAM _____

UNIT _____

INTERIM OBJECTIVE NUMBER	INSTRUCTIONAL PLAN	RESOURCES

Part 3 OUTPUT

A. Student Progress Record

B. Occupational Readiness Record

Both these items should have resulted from your work in the Recordkeeping and Follow-up component. A sample Progress Record and Occupational Readiness Record could appear in your curriculum with a brief narrative describing how they are used in the instructional process. This is most helpful to any person interested in reviewing your curriculum.

SUMMARY

Congratulations! If you have followed the Manual carefully and have constructed each component as shown in this Manual, you now should have a well organized, competency based curriculum for your Vocational Skills Training Program.

Once again we mention here as we did in the Guide that the procedures and components described are the results of suggestions by a committee of selected vocational teachers and administrators representing a number of Vocational Centers throughout the State as well as State Department Consultants. The committee feels the Guide and Manual represent all that is needed to describe and carry out a quality instructional program. The final decisions, however, rest with your local administration, your vocational director, department chairperson or whoever is responsible for quality instruction in your school.

Again it is suggested that you review the results you have achieved with the appropriate individual(s).

Remember, also, you can't sit back now and maintain this curriculum forever. Now that you understand what is involved in good curriculum design, you must recognize the value of an annual revision.

Depending on your field, such areas as job markets, students' needs and technology, change rapidly. Consequently, you should plan to review and revise your program on a regular basis.

GOOD LUCK!